

Smarting From Resistance to Smart Grids

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What is the Smart Grid?

An advanced, telecommunication / electric grid with **sensors and smart devices linking all aspects of the grid**, from generator to consumer, and **delivering enhanced operational capabilities** that :

Provide **CONSUMERS** with **the information and tools necessary to be responsive** to electricity grid conditions (including price and reliability) through the use of electric devices and new services (from smart thermostats to PHEV)

Ensure **EFFICIENT** use of the electric grid (**optimizing current assets while integrating emerging technologies** such as renewables and storage devices)

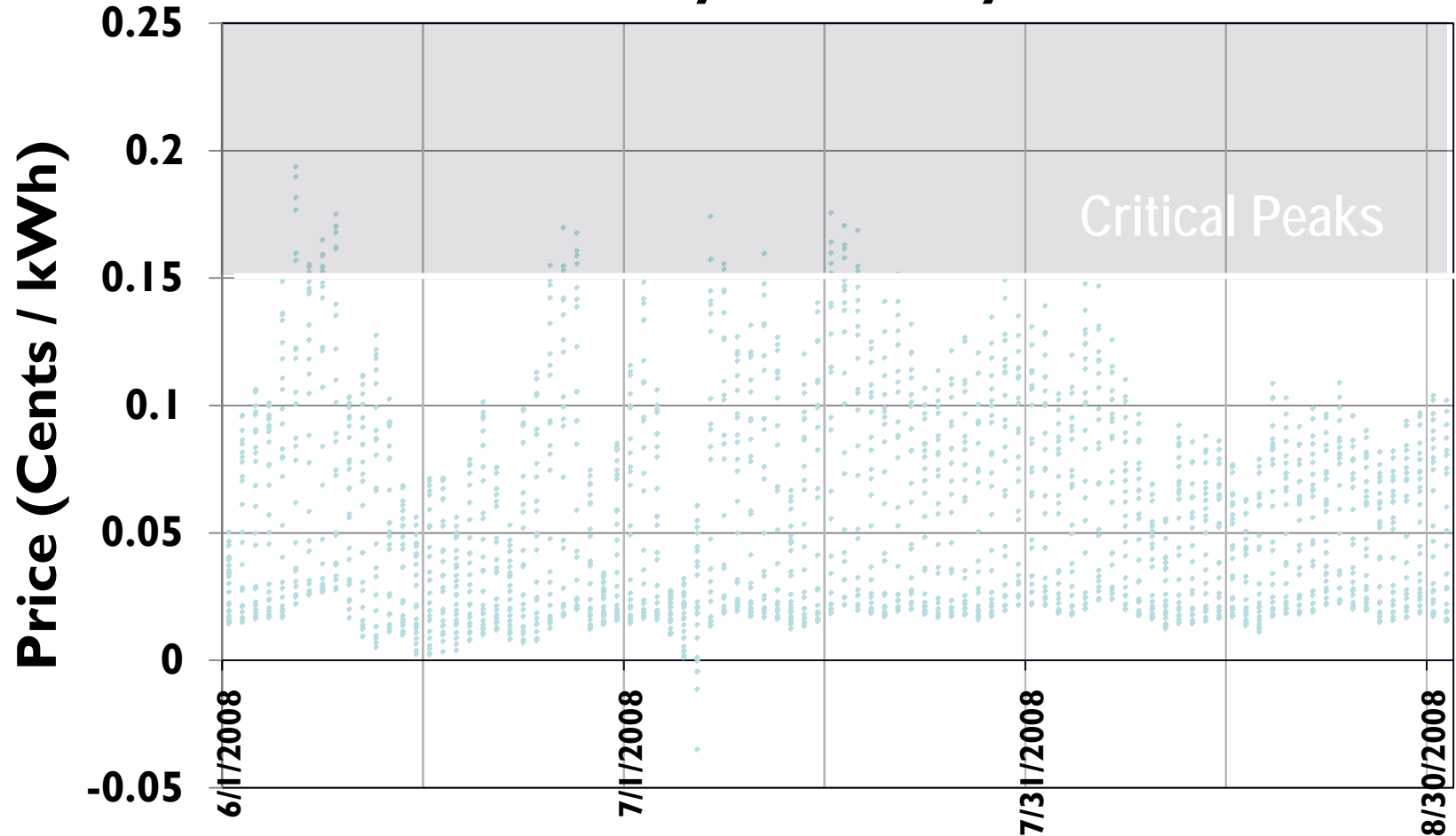
Enhance **RELIABILITY** (**protecting the grid from cyber and natural attacks, increasing power quality** and promoting early detection and self correcting grid “self-healing”)

Value For Consumers and Utilities

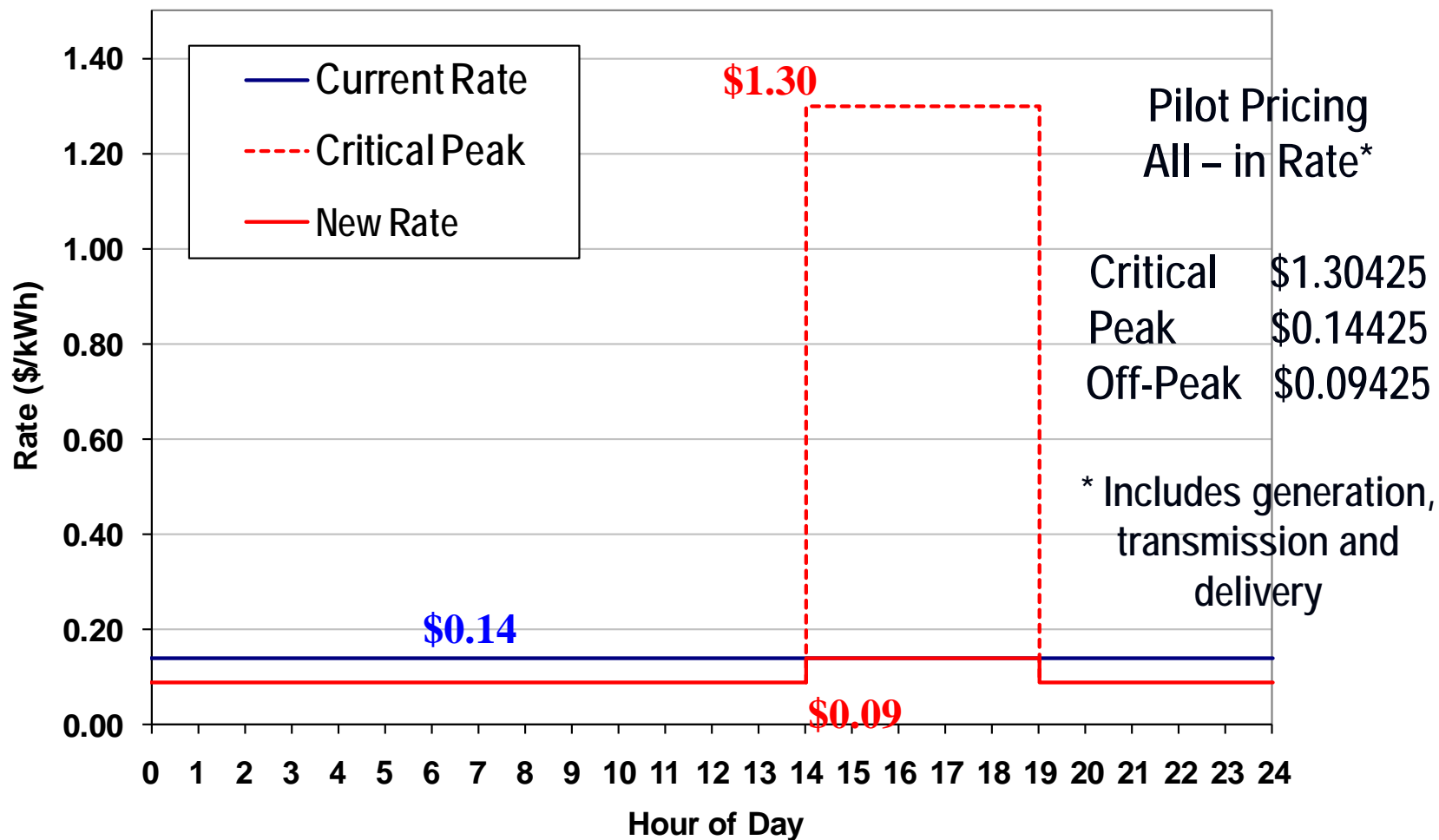
Baltimore Gas & Electric

How Smart Grid and Smart Rates Can Help

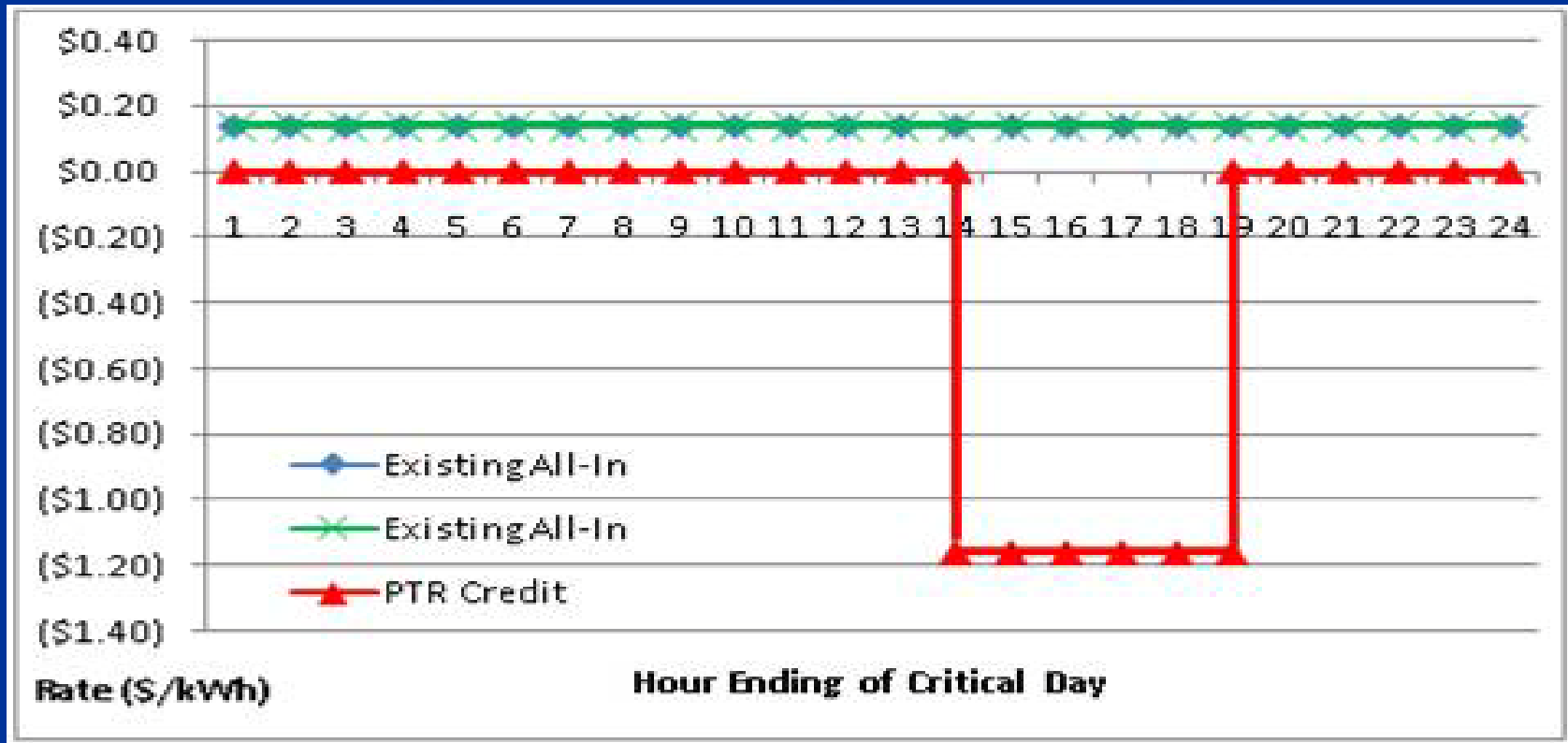
Summer Hourly Electricity Price



Dynamic Peak Pricing: Weekdays (excluding Holidays)



Peak Time Rebate: Weekdays (excluding Holidays)

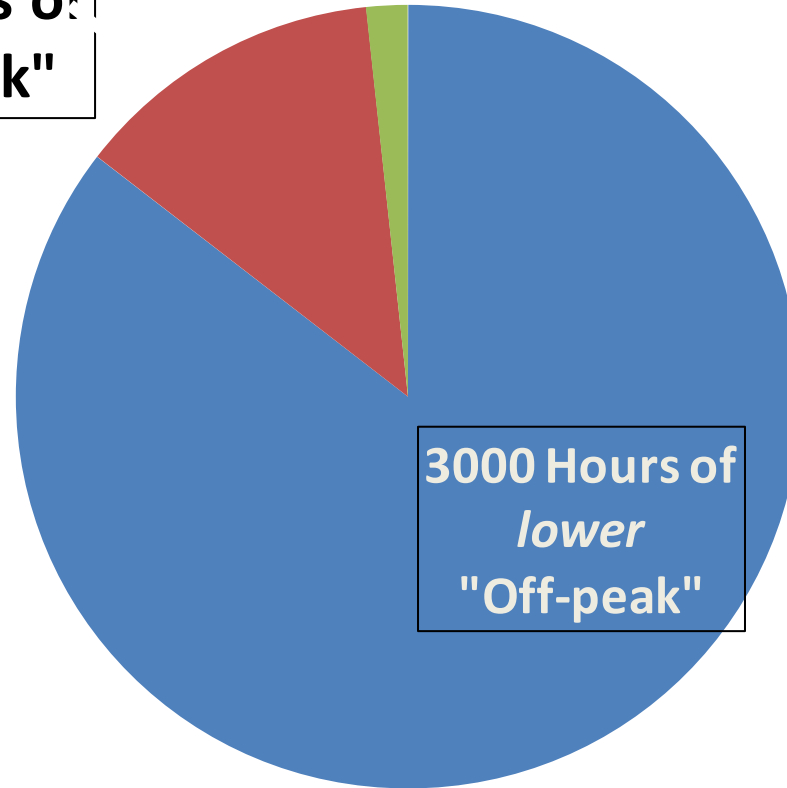


- Schedule R summer rates are \$0.14 / kWh for all summer hours
- Up to 12 critical peak days will be called by 6 p.m. the prior day
- Customers who use less during the critical period (2 – 7 p.m.) on any critical peak day will receive a rebate. Two levels being tested: \$1.75/kWh and \$1.16/kWh

Hours in Each Summer Pricing Period

60 hours of *higher* "Critical Peak"

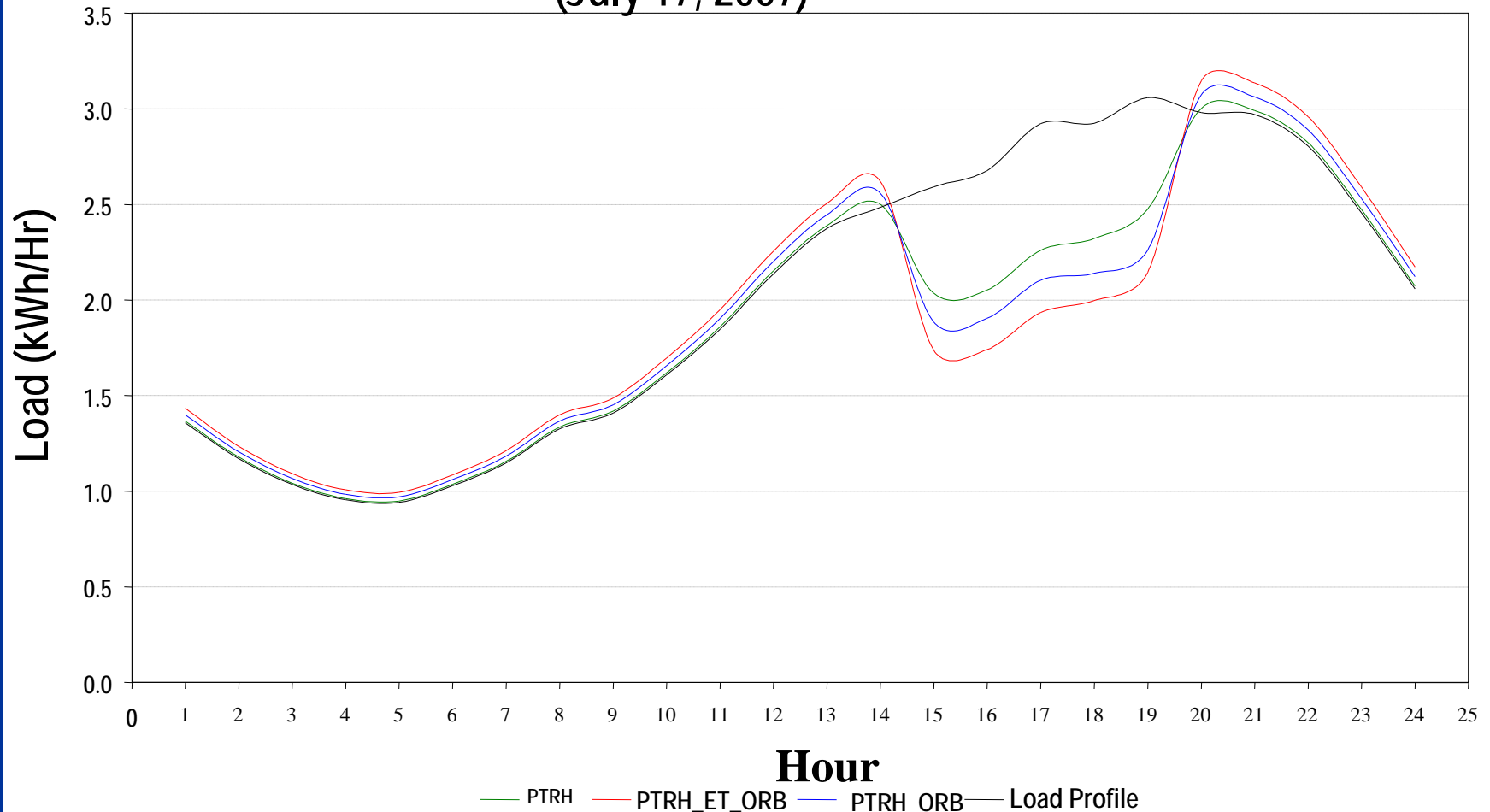
490 hours of
"On-Peak"



3000 Hours of
lower
"Off-peak"

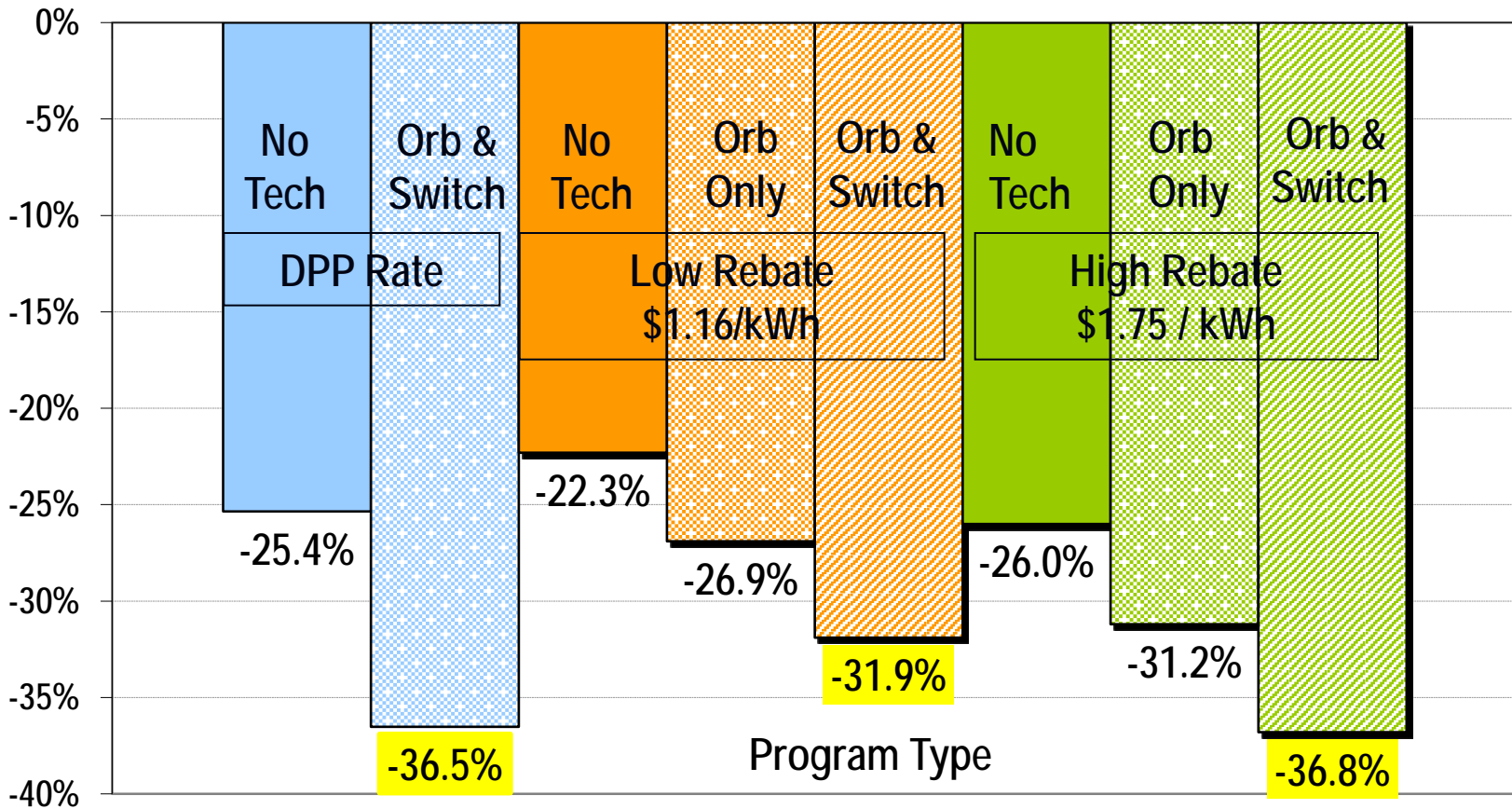
Actual Load Shapes for Participants and Control Group during Critical Peak Event

Load Profile on CPP Day before and after Demand Response
(July 17, 2007)

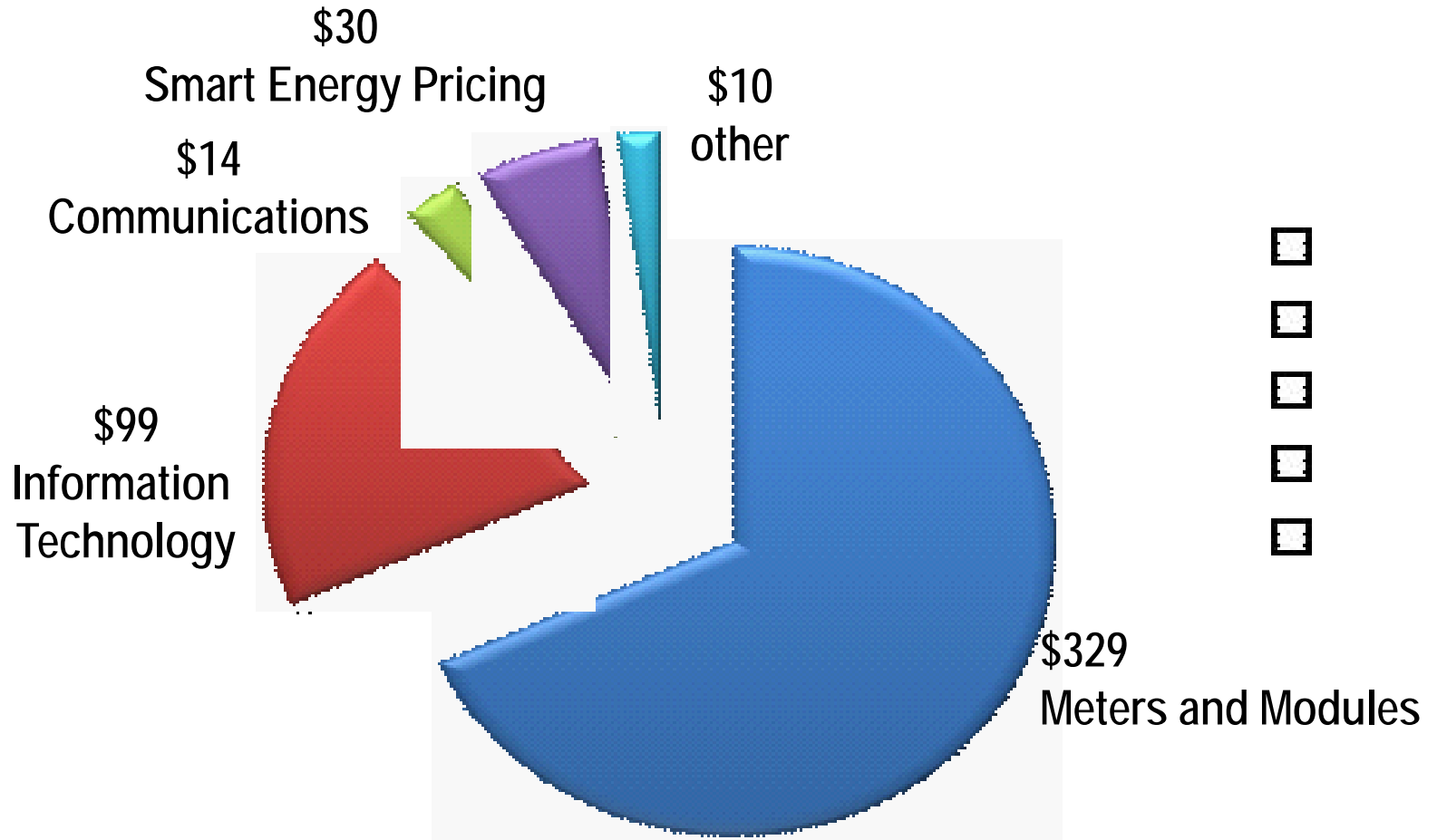


Summer 2008 Pilot Smart Energy Pricing - Peak Demand Reductions

Average Customer

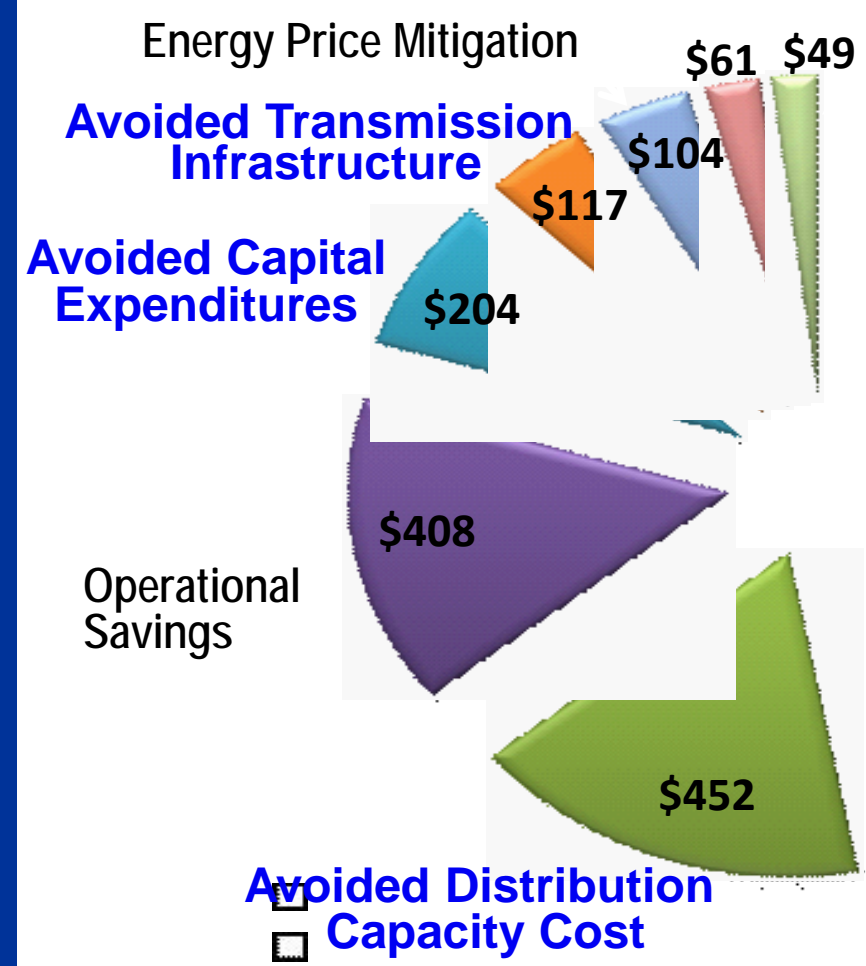


Estimated BG&E Deployment Costs \$ 482 Million (2009-14)

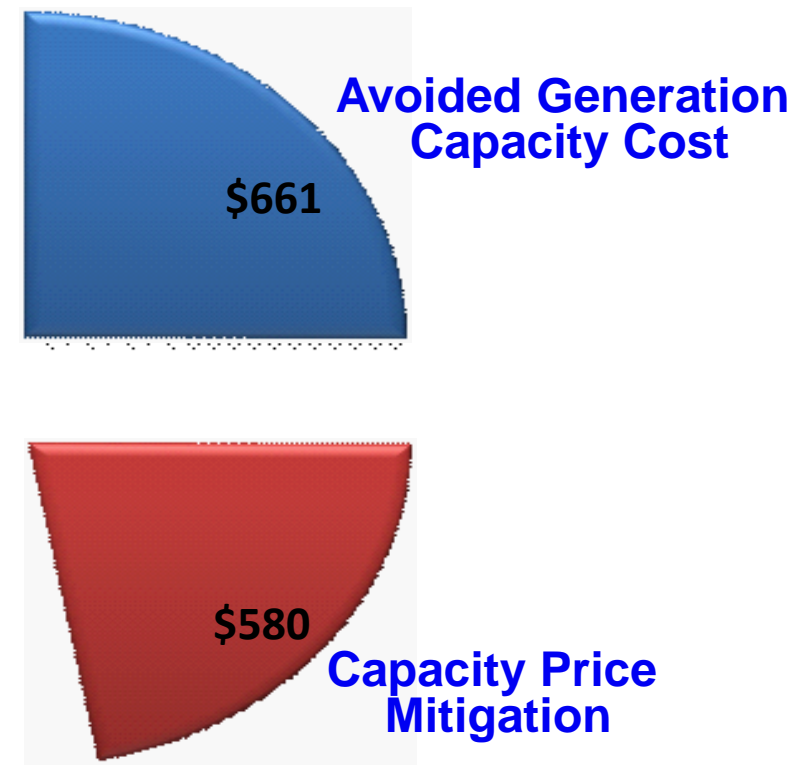


Customer Savings Greatest Benefit Projected Life-cycle Saving >\$2.6 B

Energy Revenues



Energy Conservation

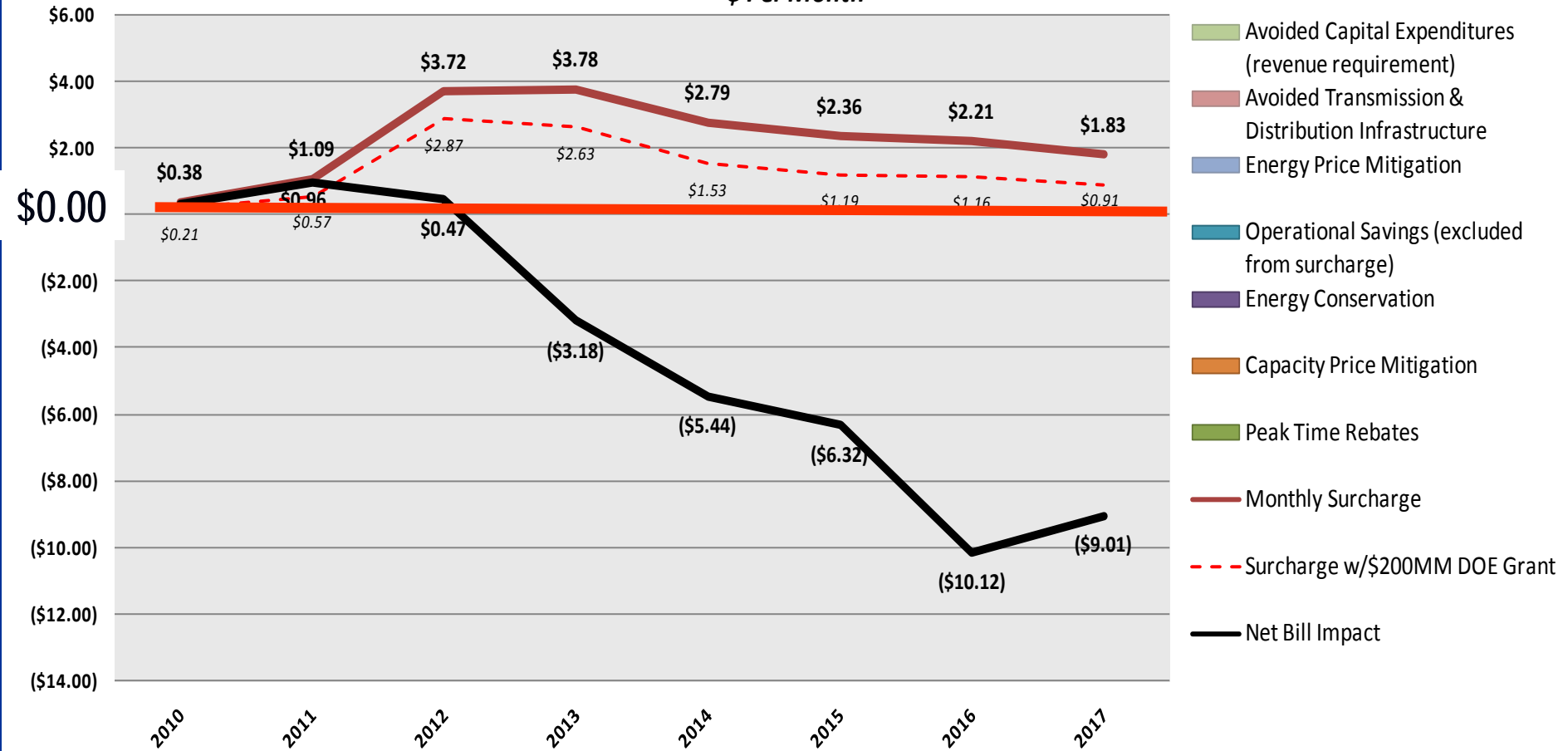


(\$'s in millions)

BG&E Residential Bill Impact

Over the life of the recovery period, the average monthly electric and gas surcharge is projected to be \$1.24 and \$1.52, respectively

Residential Electric Customer Bill Impact
\$ Per Month



Pilots Reveal Both Consumer Bill Savings and Acceptability

- Peak reductions without technology ~15%
- Peak reductions with technology ~30%
- Acceptability 80-99% would continue

Benefits to Consumers

- Defer or avoid new expensive generation
- Utilities can wait for cleaner technologies
- Reduce or eliminate reliance upon hedging contracts
- Reduce purchase of generation during expensive critical peak periods
- Improved system operations, reliability, outage control

Smart Grids Attacked on Numerous Fronts

■ Cost benefits

- *"Don't do it, it costs too much"*
- Studies reveal benefits to consumer outweigh costs

■ EMF from meters

- *More "Currents of Death" (EMF allegations from the 80s)*
- Evidence shows 1/1000 of emissions of WiFi at a cyber cafe

■ Meter accuracy

- *"My bills doubled"*
- Studies confirm accuracy, ignored rate design and weather impacts

■ Impact on low income

- *"Will raise rates, actually cut off customers, can't respond, food or A/C?"*
- Studies reveal majority low income customer benefit and/or respond

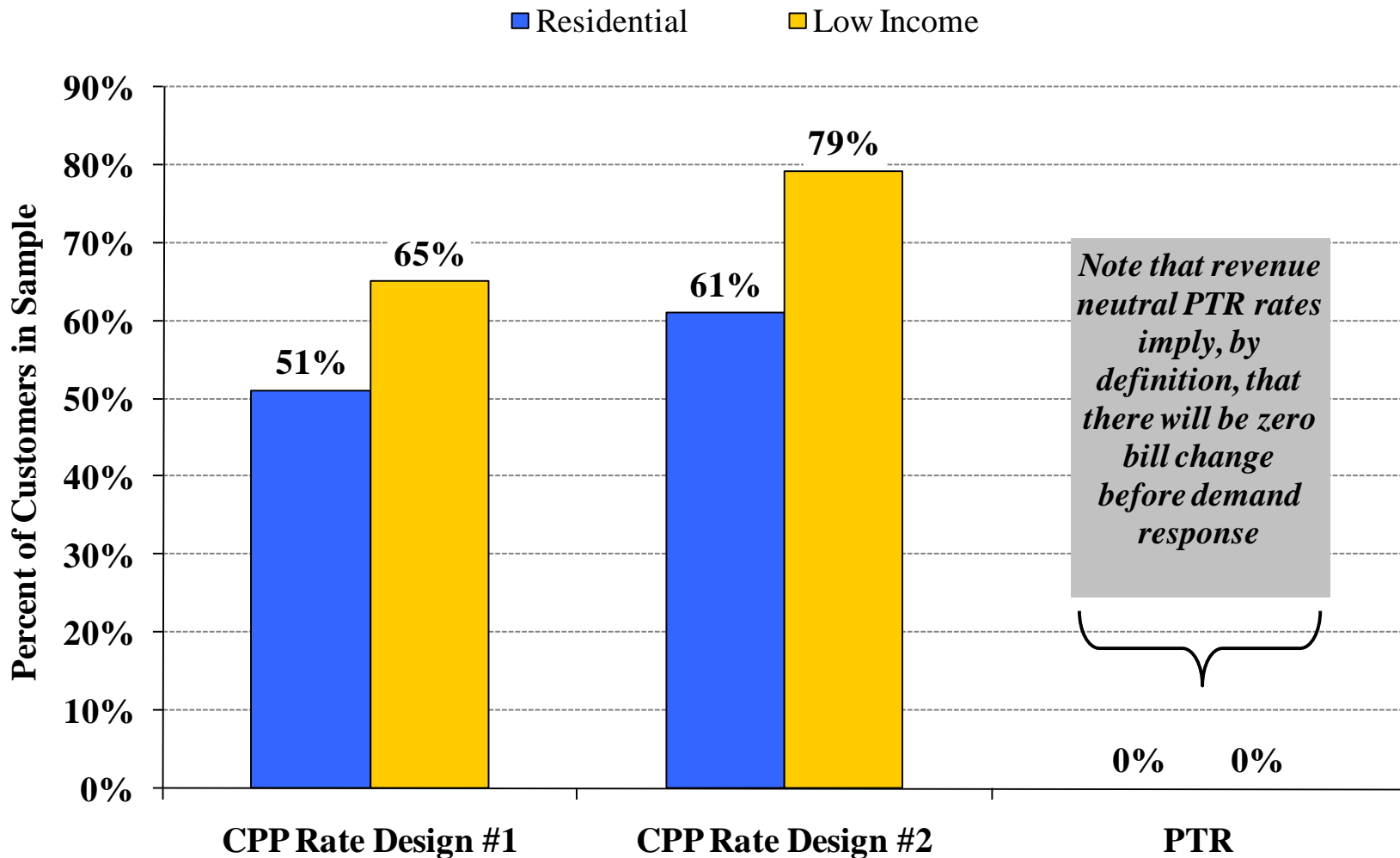
Low Income Responses

Table 1. Summary of Low Income and Average Customer Response to Dynamic Prices²

Program Results	Low Income Peak Reduction	Average Peak Reduction	Low Income vs. Average
BGE 2008: Known Low Income vs. Known Average Customer	<i>Varies depending on rate type; low income customers respond similarly to average customer</i>		100%
CL&P's PWEF Program: Known Low Income vs. Known Average Customer	<i>Varies depending on rate type; low income customers respond similarly to average customer</i>		100%
CL&P's PWEF Program (PTP high): Hardship vs. Average	13%	20%	67%
Pepco DC (price only): Low Income vs. Average Residential ¹	11%	13%	85%
PG&E SmartRate 2008: CARE vs. Average	11%	17%	66%
PG&E SmartRate 2009: CARE vs. Average	8%	15%	50%
California SPP: Low Income vs. Average	11%	13%	84%
California SPP: CARE vs. Average	3%	13%	22%

Large Percentage Of Low Income Benefit Even w/o Shifting

Percent of Sample with Immediate Bill Decreases on CPP and PTR Rates



Smart Grids Attacked on Numerous Fronts

- Dynamic pricing / critical peaks
 - *"Too few critical peak hours to make a difference"*
 - Critical peaks determine when utilities spend \$Billions on G, T & D
- Remote meter reading
 - *"Just skip me"*
 - Huge savings in costs (meter readers, special meter reads), emissions
- Privacy
 - *"Provides info on when to rob me or when to attack me"*
 - Utilities follow commission rules, eliminates meter readers walking in yards
- Shifting risk to consumers
 - *"No riders"*
 - At the end of day, consumers bear all prudent costs and risks

Smart Grids Attacked on Numerous Fronts

- Cyber security
 - *"12 year old terrorists will play with grid"*
 - Utilities recognize these risks and are prepared
- Technology changing too rapidly
 - *"Utilities aren't prepared for rapid technology changes"*
 - Installed devices don't stop, replacement depends on incremental value

RF Power Density in the Everyday Environment

Device Relative Power Density
In microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$)

Source: Richard Tell Associates, Inc.

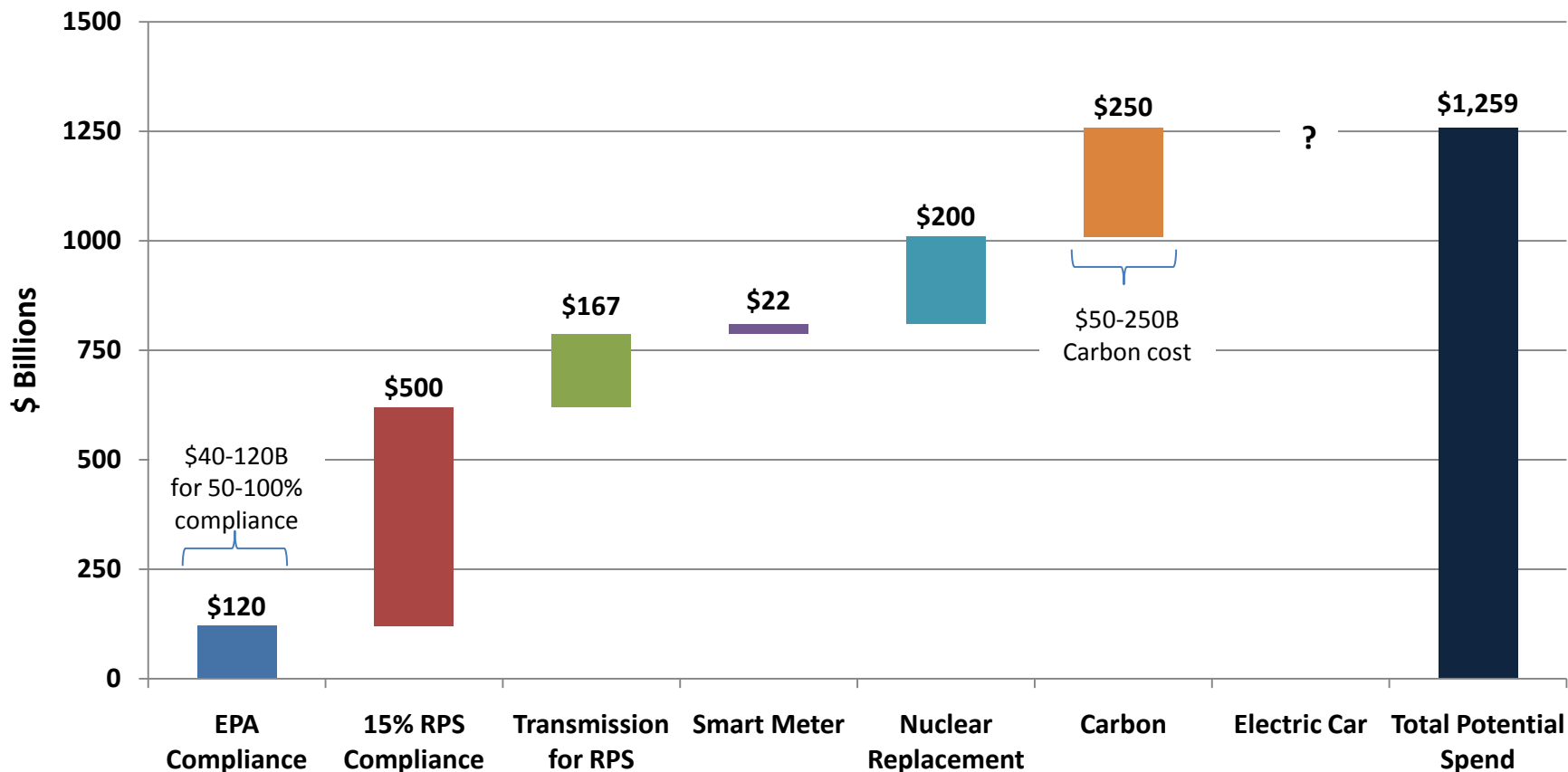
FM radio / TV broadcast station signal	0.005 microwatts
SmartMeter™ device at 10 feet	0.01 microwatts
Cyber cafe (Wi-Fi)	10-20 microwatts
Laptop computer	10-20 microwatts
Cell phone held up to head	30-10,000 microwatts
Walkie-Talkie at head	500-42,000 microwatts
Microwave oven, two inches from door	5,000 microwatts

Regulatory Compact Is Fine – *Implementation Flawed*

- Regulatory Rule
 - Does the value to consumers exceed the costs
- Again, many are coming to “help” us
- Others just want us to create a business opportunity for them
 - “Prohibit utilities from competing in retail markets or _____” (fill in blank)
 - “PURPA avoided costs standard requires payments to make me profitable”
- What is the purpose of an RPS?
 - Support wind and solar industry or reduce green house gases?
 - Energy efficiency costs ~3.5 cents/kWh

Are policies missing the point?

Credit Suisse: "Hey, ratepayers, can you spare a trillion?"



Assumptions

EPA Compliance: \$600/KW; RPS: 15% by 2020, Transmission Cost 1/3 of RPS Spend; Smart Meter: 85% Implementation; Nuclear Replacement: 25 GW Replacement at \$8000/KW

Source: "Impediments to Achieving the Vision," Dan Eggers, Presented to the Aspen Institute Energy Policy Forum July 3rd, 2010. Based on *Energy Velocity*, NRC, Company Data, Credit Suisse Estimates.

Are Policy Directions *Going the Right Way?*

- Electric industry requires long term planning cycles
 - **We need to start now!**
- Optimize investments in smart grid, renewables, etc. for the benefits of ALL
 - Are Home Energy Management devices that just look at a single home appropriate?
 - Are DR investments by 3rd parties leaving money on the table?
 - Are benefits of load limiting devices being undermined by rate design?
 - Can we afford to deploy plug-in electric vehicles without smart grids?
 - How do we integrate distributed generation and storage?

Summary

- The future competitiveness of the United States depends upon making the right public policy decisions today
- A robust economy will depend upon energy which is clean, reasonably priced and reliable
- National energy policy for energy independence will depend upon the ability of the electric grid to efficiently meet the demands of plug-in electric vehicles